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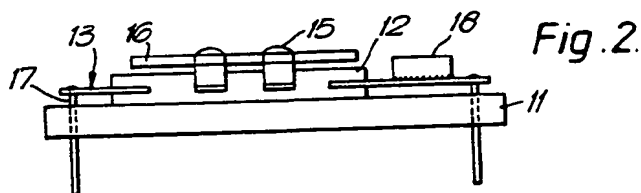
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EP 0167055 A1 EP 0019185 A2

(58) Field of search
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(54) **Crystal oscillator**

(57) In a crystal oscillator package, the maintaining circuit is provided in integrated form (12). This integrated circuit has terminals (15) for supporting the crystal (16) and for coupling the crystal to the integrated circuit. The structure is particularly suitable for automatic assembly.



At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

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Fig. 1.

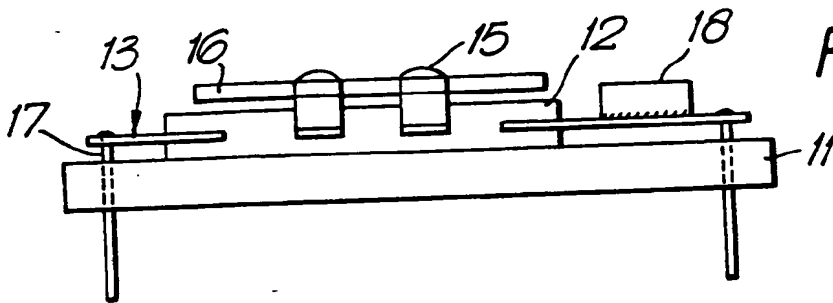
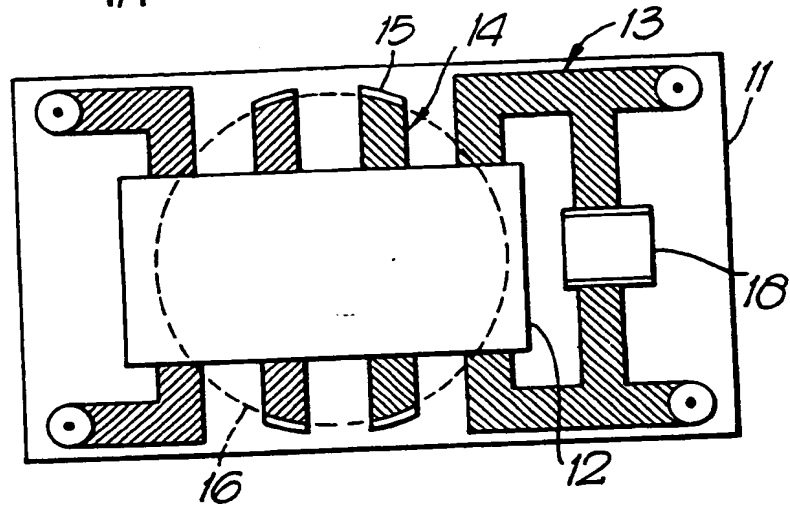


Fig. 2.

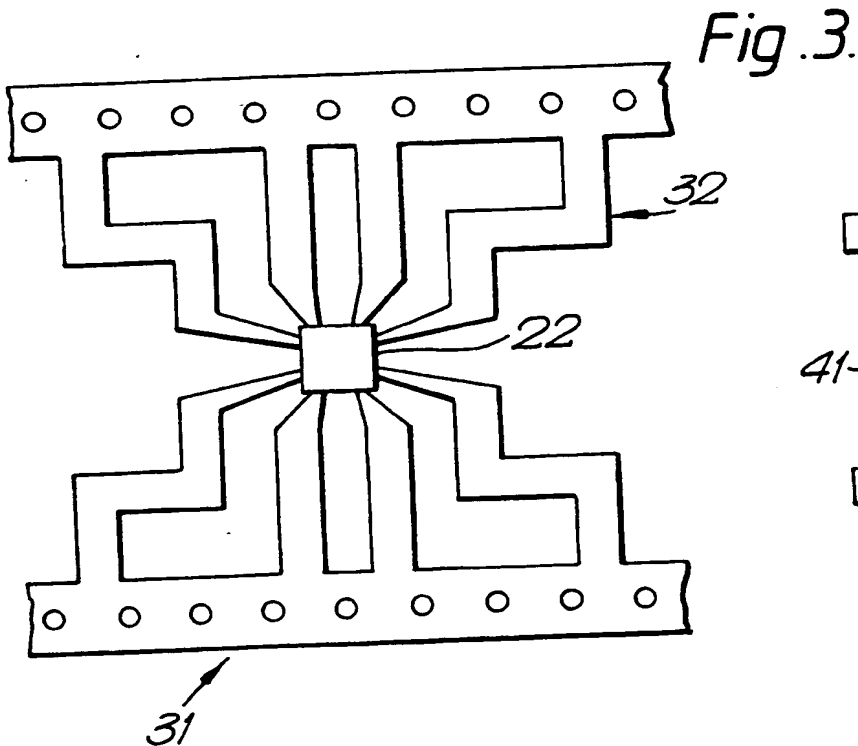


Fig. 3.

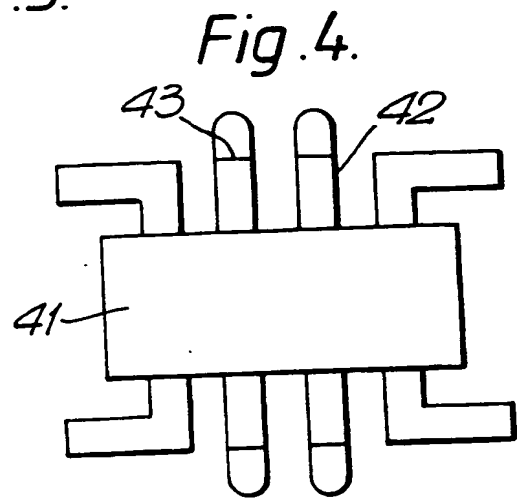


Fig. 4.

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CRYSTAL OSCILLATOR

This invention relates to crystal oscillators and in particular to an oscillator package construction.

A quartz crystal oscillator package conventionally comprises a support base or header on which the crystal is mounted together with a number of electrical components forming a maintaining circuit. In this arrangement the crystal is supported on the header in such a way that the crystal vibrations are substantially undamped and environmental stresses due e.g. to thermal effects are minimised. Typically the components forming the maintaining circuit are mounted on a substrate in the form of a hybrid circuit. The assembly is protected by a housing or a can secured to the header. Lead outs through the header provide electrical connection to the assembly.

Whilst this structure is satisfactory in operation it is not readily adapted to automatic assembly techniques. Thus, the manufacturing process is relatively costly.

The object of the invention is to minimise or to overcome this disadvantage.

According to this invention there is provided a crystal oscillator package, including an integrated circuit mounted on a support structure and having terminals extending from the integrated circuit whereby a crystal is mounted and electrically connected to the circuit, the integrated circuit, in use, providing maintenance of oscillation of the crystal.

An embodiment of the invention will now be described with reference to the accompanying drawings wherein:-

Figure 1 is a side view of the crystal oscillator package;

Figure 2 is a plan view of the package of Figure 1;

and Figures 3 and 4 illustrate a fabrication process for manufacturing the oscillator package of Figures 1 and 2.

Referring to Figures 1 and 2, the oscillator package includes a support base or header 11 on which a plastics packaged integrated circuit 12 is mounted. The integrated circuit is provided with a lead frame having a first array 13 generally in the plane of the circuit and providing electrical connection between the integrated circuit 12 and external circuitry (not shown), and a second array 14 having bent-up portions 15 extending perpendicular to the plane of the circuit 12 and providing a mount for a crystal 16. Typically the crystal 16 is in the form of a disc. The bent-up portions 15 also provide a means of coupling the crystal 16 electrically to the circuit 12. Preferably the arrangement is such that the crystal 16 is mounted in a plane parallel to that of the integrated circuit 12.

The first array 13 of the lead frame comprises a number of terminals each bonded, e.g. by soldering, to a feed-through terminal 17 mounted in the header 11. The first array may also provide support and connection to one or more discrete components such as a chip capacitor 18.

The assembly is covered by a protective housing or can (not shown). This housing may be evacuated or filled with an inert gas.

The oscillator package of Figures 1 and 2 may be fabricated automatically by the following automatic process which is described with reference to Figures 3 and 4.

A conductive tape, generally indicated as 31, is provided having integrated circuit lead frame structures 32 at regular intervals. Integrated circuits 22 are mounted one on each lead frame structure and are bonded thereto using known techniques. A plastics encapsulation 41 (Figure 4) is applied to the integrated circuit and the structure is then cropped from the lead frame. Selected leads 42 extending from the plastics encapsulation 41 are bent along the lines 43 substantially ~~perpendicular to the plane of the circuit~~ and lead frame. A crystal may then be mounted on these bent-up portions and the assembly mounted on a header to form the structure of Figure 1.

CLAIMS

1. A crystal oscillator package, including an integrated circuit mounted on a support structure and having terminals extending from the integrated circuit whereby a crystal is mounted and electrically connected to the circuit, the integrated circuit, in use, providing maintenance of oscillation of the crystal.
2. An oscillator package as claimed in claim 1, wherein the crystal is disposed in a plane parallel to that of the integrated circuit.
3. An oscillator package as claimed in claims 1 or 2 wherein the integrated circuit has further terminals adapted to receive one or more discrete components.
4. An oscillator package as claimed in claims 1, 2 or 3, and mounted in an evacuated housing.
5. An oscillator package substantially as described herein with reference to and as shown in the accompanying drawings.
6. A method of manufacturing an oscillator package substantially as described herein with reference to and as shown in the accompanying drawings.